REMARKS

Claims 1, 3-10, and 16-29 are pending. Claims 7-9 and 16-26 are withdrawn. Claims 1 and 27 are independent claims. No new matter has been added. Reconsideration and further examination are respectfully requested.

Applicants appreciate the indication of allowable subject matter with respect to claims 5, 6 and 10. Applicants respectfully reserve the right to incorporate this subject matter into one or more independent claims at a later date.

Claim Rejections – 35 USC § 103

The Office Action rejects claims 1, 4 and 27-29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,081,305 (Sato et al.) with U.S. Patent Application No. 2005/0121768 (Edelstein et al.) and U.S. Patent Application No. 2004/0084778 (Hosoda et al.).

Reconsideration and withdrawal of the rejections are respectfully requested.

Claim 1

Independent claim 1 recites a device comprising: a semiconductor substrate; a pixel cell array integrated with the semiconductor substrate; a liquid crystal layer in contact with the pixel cell array; a substantially transparent protective cover coupled to the liquid crystal layer; and a base coupled to the semiconductor substrate, wherein thermal expansion characteristics of the base are substantially similar to thermal expansion characteristics of the protective cover.

Neither Sato et al., nor Edelstein et al. nor Hosoda et al., nor any proper combination thereof, teach or suggest the device of claim 1.

Sato et al disclose a liquid crystal light valve constructed by a semiconductor substrate 100 on which a pixel circuit and a drive circuit are formed; a facing substrate 300 in which a facing electrode 302 made of a transparent conductive material, such as ITO (Indium-tin-oxide), is formed on a transparent glass substrate 301; and a sealing medium 510 for causing the

substrate 100 to adhere to the substrate 300 with a liquid crystal 200 disposed therebetween (col. 13, lines 31-39).

Sato et al. further disclose that the liquid crystal light valve constructed as mentioned above is of a reflection type in which a strong light irradiated from the glass substrate 300 side is reflected by the pixel electrode 181 and the intensity of the reflected light is controlled by the state of the liquid crystal 200 (Col. 15, lines 6-11).

The semiconductor substrate 100 on which the pixel circuit 1, horizontal scanning circuit 3, vertical scanning circuit 4, and the like are formed is bonded to a ceramic substrate 500 by a conductive paste with the circuit section upside (col. 16, lines 59-63). The liquid crystal 200 is filled in between the semiconductor substrate 100 and the substrate 300 which faces the substrate 100 (col. 16, lines 63-65). The liquid crystal 200 is sealed by a seal medium 510 around the periphery and is protected from moisture of the outside and the like (col. 16, lines 65-67). The facing electrode 302 on the surface of the facing substrate 300 is connected with the wiring patterns, such as an electrode 181 formed in the uppermost metal layer 180 in the semiconductor substrate 100, by using the conductive paste 530 (col. 16, line 67-col. 17, line 4).

However, Sato et al. do not teach or suggest a device comprising: a semiconductor substrate; a pixel cell array integrated with the semiconductor substrate; a liquid crystal layer in contact with the pixel cell array; a substantially transparent protective cover coupled to the liquid crystal layer; and a base coupled to the semiconductor substrate, wherein thermal expansion characteristics of the base are substantially similar to thermal expansion characteristics of the protective cover, as recited in claim 1.

Notably, even if the substrate 110, the liquid crystal 200, the glass substrate 300 and the ceramic substrate 500 constitute a semiconductor substrate, a liquid crystal layer, a substantially transparent protective cover, and a base, respectively, as asserted in the Office Action, Sato et al. do not appear to teach or suggest that the thermal expansion characteristics of such base are substantially similar to thermal expansion characteristics of such protective cover.

The Office Action cites paragraph 0036 of Edelstein et al. as disclosing glass and ceramic with similar CTE. The Office states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to the base and protective cover of similar CTE in order to provide a type of ceramic material for its base and glass material for its protective cover as required by Sato.

Applicants note that the cited portion of Edelstein et al. states that "[a]t step 306, the remaining volume of the cylindrical blind via is filled with a second via material, which is either conducting or insulating, comprising material such as poly-Si, SiO_2, Si_3N_4, CVD-W, an inorganic oxide (e.g., glass, ceramic or glass ceramic compounds), a metal ceramic compound such as Cu-cordierite, or other suitable materials having CTE in the range of ~0 to ~5 ppm/° C., wherein the second via material has a thermal coefficient of expansion which matches or more closely approximates the CTE of the carrier substrate material (e.g., Si). In the example of Cu fill in a 100 μm diameter Si through-via, it has been calculated that a Cu plating thickness equal to 1/10 of the via diameter and filled with SiO2 will lead to the desired thermal and conductive properties.

However, such statements regarding a via material and a carrier substrate material, cannot possibly stand for a universally-applicable principle that would lead one of ordinary skill in the art to make thermal expansion characteristics of a base substantially similar to thermal expansion characteristics of a protective cover, even if the base is a ceramic substrate as in Sato et al. and even if the protective cover is a glass substrate as in Sato et al.

The Office Action further cites paragraph 0003 of Hosoda et al. as teaching that cracking in structures can occur due differences in the CTE of materials. The Office Action states that [h]ence, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form layers within the package of Sato with similar CT to reduce cracks etc. caused by CTE mismatch as taught by Hosoda.

Applicants note that the cited portion of Hosoda et al. states that "[i]n semiconductor device fabrication processes, . . . the semiconductor wafer is cut along dicing lines into discrete LSI chips" and that "stresses in the dicing, and stresses, etc. due to thermal expansion coefficient

differences between the inter-layer insulating films and a sealing resin cause cracks in the inter-layer insulating films". (para 0003). However, such statements cannot possibly stand for a universally-applicable principle that would lead one of ordinary skill in the art to make thermal expansion characteristics of a base substantially similar to thermal expansion characteristics of a protective cover, even if the base is a ceramic substrate as in Sato et al. and even if the protective cover is a glass substrate as in Sato et al.

Indeed, Hosoda et al. teach a structure in which the inter-layer insulating film has a thermal expansion coefficient that is "is higher by about 5 times than the inter-layer insulating films they are adjacent to". (para 0055). Thus, Hosoda et al. appear to teach away from the principle for which it is cited in the Office Action, thereby teaching away from the combination proposed in the Office Action.

The Office Action further cites MPEP 2144.07, which states that "the selection of a known material based on its suitability for its intended purpose supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) . . . .'Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting that last piece to put in the last opening in a jig saw puzzle.' 325 U.S. at 335, 65 USPQ at 301)"

However, the combination proposed in the Office Action is not analogous to the cases set forth in MPEP 2144.07. The combination proposed in the Office Action, cannot possibly be viewed as simply selecting the last piece to put in the last opening in a jig saw puzzle.

Accordingly, neither Sato et al., nor Edelstein et al. nor Hosoda et al., nor any proper combination thereof, teaches or suggests a device comprising: a semiconductor substrate; a pixel cell array integrated with the semiconductor substrate; a liquid crystal layer in contact with the pixel cell array; a substantially transparent protective cover coupled to the liquid crystal layer; and a base coupled to the semiconductor substrate, wherein thermal expansion characteristics of the base are substantially similar to thermal expansion characteristics of the protective cover, as recited in claim 1.

Independent claim 1 should therefore be allowed.

Claim 27

Independent claim 27 recites a system comprising: an Ultra High Pressure light source to emit light; a condenser lens to condense the light; a display device to receive the condensed light and to emit image light, the display device comprising: a semiconductor substrate; a pixel cell array integrated with the semiconductor substrate; a liquid crystal layer in contact with the pixel cell array; a substantially transparent protective cover coupled to the liquid crystal layer; and a base coupled to the semiconductor substrate, thermal expansion characteristics of the base being substantially similar to thermal expansion characteristics of the protective cover; and a projector lens to project the image light.

Neither Sato et al., nor Edelstein et al. nor Hosoda et al., nor any proper combination thereof, teach or suggest the system of claim 27.

Sato et al. do not teach or suggest a system comprising: an Ultra High Pressure light source to emit light; a condenser lens to condense the light; a display device to receive the condensed light and to emit image light, the display device comprising: a semiconductor substrate; a pixel cell array integrated with the semiconductor substrate; a liquid crystal layer in contact with the pixel cell array; a substantially transparent protective cover coupled to the liquid crystal layer; and a base coupled to the semiconductor substrate, thermal expansion characteristics of the base being substantially similar to thermal expansion characteristics of the protective cover; and a projector lens to project the image light, as recited in claim 27.

Notably, and at the very least, even if the substrate 110, the liquid crystal 200, the glass substrate 300 and the ceramic substrate 500 constitute a semiconductor substrate, a liquid crystal layer, a substantially transparent protective cover, and a base, respectively, as asserted in the Office Action, Sato et al. do not appear to teach or suggest that the thermal expansion characteristics of such base are substantially similar to thermal expansion characteristics of such protective cover.

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However, such statements regarding a via material and a carrier substrate material, cannot possibly stand for a universally-applicable principle that would lead one of ordinary skill in the art to make thermal expansion characteristics of a base substantially similar to thermal expansion characteristics of a protective cover, even if the base is a ceramic substrate as in Sato et al. and even if the protective cover is a glass substrate as in Sato et al.

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However, the combination proposed in the Office Action is not analogous to the cases set forth in MPEP 2144.07. The combination proposed in the Office Action, cannot possibly be viewed as simply selecting the last piece to put in the last opening in a jig saw puzzle.

Accordingly, neither Sato et al., nor Edelstein et al. nor Hosoda et al., nor any proper combination thereof, teaches or suggests a system comprising: an Ultra High Pressure light source to emit light; a condenser lens to condense the light; a display device to receive the condensed light and to emit image light, the display device comprising: a semiconductor substrate; a pixel cell array integrated with the semiconductor substrate; a liquid crystal layer in contact with the pixel cell array; a substantially transparent protective cover coupled to the liquid crystal layer; and a base coupled to the semiconductor substrate, thermal expansion

characteristics of the base being substantially similar to thermal expansion characteristics of the protective cover; and a projector lens to project the image light, as recited in claim 27.

Independent claim 27 should therefore be allowed.

Dependent claims

Claims 3-6 and 10 depend from independent claim 1 and therefore should be allowed for at least the reasons set forth above with respect to independent claim 1.

Claims 28-29 depend from independent claim 27 and therefore should be allowed for at least the reasons set forth above with respect to independent claim 27.

CONCLUSION

For at least the reasons set forth above, Applicants respectfully submit that the present application is in condition for allowance. Accordingly, reconsideration and allowance of the present application are respectfully requested.

Because the reasons set forth above are sufficient to overcome the rejections set forth in the outstanding Office Action, Applicants do not address some of the assertions set forth therein and/or other possible reasons for overcoming the rejections. Nonetheless, Applicants reserve the right to address such assertions and/or to present other possible reasons for overcoming the rejections in any future paper and/or proceeding.

If the Examiner believes that a telephone interview would expedite the prosecution of this application in any way, the Examiner is cordially requested to contact the undersigned via telephone at (203) 972-0006, ext. 1014.

Respectfully submitted,

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